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cultivating a plant comprising the tissue of claim ~~42~~ 15, and allowing insects to ingest [the plant] said tissue [of claim 42].

Claim ~~46~~ 18 (amended): 2 7

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The plant cell of claim ~~16~~ or ~~26~~ [to which cell resistance to an insect] , wherein said cell is rendered toxic to an insect belonging to an insect order selected from the group consisting of Lepidoptera, Coleoptera, Diptera, Hymenoptera, Mallophaga, and Trichoptera [is conferred].

Please cancel claim 45.

Please add the following new claims:

J 1 ~~49~~ 21. A plant cell comprising a gene encoding a *Bacillus thuringiensis* endotoxin
J 2 or endotoxin fragment, wherein said gene is expressed at a level rendering such cell
3 toxic to an insect, said cell being capable of undergoing mitosis to yield a second
J,J 4 plant cell comprising said gene, wherein said gene is expressed at a level rendering
5 said second plant cell toxic to an insect.

J 1 ~~50~~ 22. The plant cell of claim ~~49~~ 21 wherein said cell is of a dicot species.

1 51. The plant cell of claim 49 wherein said cell is of a monocot species.

1 52. The plant cell of claim 51 wherein said monocot species is a species of
2 maize.

Remarks

The specification has been amended to correct an obvious typographical error wherein one line of the illustration at page 86 had been shifted one space. Pursuant to the

Examiner's remarks, the entire illustration has been cancelled and the corrected illustration reinserted. I hereby certify that no new matter is being added by this amendment. Claims 25-32, 44, and 46 have been amended above to more clearly describe what applicants believe to be their invention. Claim 45 has been cancelled. On December 3, 1992, applicants presented claims 47 and 48 pursuant to 37 CFR §1.605. Support for new claims 49-52 is found at, among other places, page 15, first paragraph; the sentence spanning pages 35-36; page 37, first full paragraph; and page 48, defining "plant tissue" and "plant cell." The corresponding portions of applicants' original specification filed in September 1983 are, respectively, the paragraph spanning pages 8-9; page 20, lines 23-27; page 21, lines 7-16; and definitions at pages 27-28. Accordingly, claims 15-44 and 46-52 are pending in the application. In view of the following remarks, applicants request reconsideration and withdrawal of the outstanding rejections.

1. In response to the §112, second paragraph, rejection of claims 15 and 44-46 set forth at page 2 of the Office Action, applicants have made clarifying amendments to claims 44 and 46. Regarding claim 15, it is irrelevant whether the plant tissue is planted in a field or ground up and sprayed in a field; either activity would be within the scope of claim 15 as neither activity would have been possible without applicants' invention. Claim 15 covers any method of allowing an insect to ingest plant tissue which has been transformed according to applicants' teachings.

2. Applicants traverse the §112, first and second paragraphs, rejections of claims 15-46 set forth at pages 2-3 of the Office Action. Applicants were the first to conceive of plants transformed to express intracellular proteins toxic to insects such that insect resistance is thereby conferred on the plant, the first to reduce to practice such a plant, and the first to provide a teaching of how to create such plants. Its implications for agriculture are staggering. This was truly a pioneering invention.

In their specification, applicants describe the steps taken with a particular gene to illustrate their invention. The particular gene is clearly one example, and applicants clearly

teach that any other *B.t.* endotoxin gene or gene fragment can be used, so long as it encodes an insecticidal protein. Several *B.t.* insecticidal genes had been cloned and identified prior to the filing of applicants' first application in 1983, and many more have been cloned and identified since. Also since that time, plants have been transformed with genes other than the HD-73 type exemplifying the subject invention by techniques disclosed in the subject application. Thus, while applicants did not exemplify plants transformed with each *B.t.* gene within the scope of the claimed invention, they did enable the scope of the claimed invention. Forcing applicants to limit the scope of their claims to the examples disclosed in the specification would allow competitors to follow applicants' teachings and avoid infringement simply by substituting a different *B.t.* gene. This is profoundly inequitable, given the importance of the subject invention to society and applicants' own teaching that other *B.t.* genes will work. See *In re Goffe*, 191 USPQ 429, 431 (CCPA 1976). Reconsideration is respectfully requested.

3. Next, claims 23 and 26-46 stand rejected under §112, first paragraph, as enabled only to the extent that the transforming *B.t.* gene encodes at least the N-terminal 607 amino acids of a *B.t.* endotoxin. This rejection might be appropriate if applicants were claiming the truncated *B.t.* genes themselves, but that is not the case. Applicants are claiming plant cells transformed with truncated *B.t.* genes. One such gene, encoding a protein consisting of the 607 amino acid N-terminal portion of a *B.t.* endotoxin, is but an example, proving that the claimed cells can be created. The skilled artisan would expect to be able to transform plants with other truncated *B.t.* genes based on this disclosure.

It is well settled that applicants are not required to disclose every species encompassed by their claims. *In re Angstadt*, 190 USPQ 214, 218 (CCPA 1976). While there must be sufficient disclosure, it need not be by example—terminology can suffice. *In re Marzocchi*, 169 USPQ 367, 369 (CCPA 1971). Applicants have broadly taught how to transform plants with *B.t.* genes, both full-length and truncated, and have illustrated their teaching with specific examples. Applicants respectfully suggest that if the claims are limited in accordance with the Examiner's suggestions, the only way applicants could obtain

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meaningful literal scope for their indisputably major contribution to the art would be to make almost every possible truncation of almost every known *B.t.* gene and transform a plant with each one, then describe each in detail in an application. This is certainly contrary to the policy behind the patent law. See *In re Goffe, supra*. Finally, for reasons set forth in applicants' response to the last Office Action (which is incorporated herein by reference), applicants assert that all pending claims were enabled as of the filing date of applicants' original application and accordingly are entitled to benefit of that date. In view of the foregoing, reconsideration is respectfully requested.

4. Claims 15-16, 19, 22, 26, 28-29, and 39-46 stand rejected under §112, first paragraph, as the disclosure is allegedly enabling only for dicots. In response, applicants assert first that regeneration of monocots from tissue culture was known in the art prior to September 24, 1983; and second, that, while the "cells of the invention include those within plants" (Office Action page 5, quoting from page 12 of applicants' last response), applicants have never asserted that those are the only cells within the scope of the invention.

Regarding the first assertion, in Example 14 (page 140, present specification) and Exhibit 12 (paragraph 22, Cardineau Declaration), applicants disclosed transformed embryogenic maize calli. By September 1983, regeneration of Graminae from cellular culture, as exemplified by maize, was known to the skilled artisan. As evidence, see Hibberd *et al.*, U.S. Patent No.. 4,642,411, commenting on the state of the art in 1982:

> In maize, the development of tissue cultures capable of plant regeneration was accomplished . . . (Green and Rhodes, 1982 in Maize for Biological Research, W.F. Sheridan (ed.), pp. 367-371, Plant Molecular Biology Association, Charlottesville, VA) . . . . With N6 or MS growth media . . . and a synthetic auxin, such as . . . (2,4-D), tissue cultures develop rapidly . . . . Removal of the 2,4-D from the growth medium permits these cultures to produce large numbers of regenerated plants. Cultures of this type have proved capable of regenerating plants for up to three years (Column 2, lines 24-42, emphasis added).

This is consistent with what is later reported by Vasil in 1988. Since applicants teach transformation of maize calli, teach that regeneration of plants is possible from cells

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transformed to express endotoxin genes, and since regeneration of plants from maize callus was routine prior to September 1983, they enabled transformation of a monocot, maize.

Regarding the second assertion, the specification states in the paragraph bridging pages 35-36: "Further, the invention provides plant tissue comprising a plant cell whose genome includes T-DNA comprising an insecticide structural gene . . . ." This clearly shows that applicants did not intend to restrict the scope of their invention to insect resistant plants; rather, the crux of this invention is plant cells which are toxic to an insect. This is also reflected in applicants' last response at page 12 and at page 20, among other places, and is specifically claimed in new claims 49-52. Applicants' transformed maize calli, mentioned above, is an example of monocot cells of the subject invention. Reconsideration is respectfully requested.

5. In response to the §112, first paragraph, rejection of claims 15-46 set forth at pages 5-6 of the Office Action, applicants reassert the remarks made in sections 2 and 3 above as if fully set forth herein. Applicants do not imply that the lepidopteran-active protein gene used to exemplify their invention will code for toxicity against all insects. Rather, applicants teach that any *B.t.* endotoxin gene can be used according to the subject invention to confer toxicity upon the plant cell against whatever insect that particular endotoxin is active against in its natural *B.t.* host. The specification provides disclosure of a number of *B.t.* genes, together having activity against a large number of insect species. Many were known prior to the filing of the original specification, and many *B.t.* genes have been discovered since, but all can be used in applicants' invention according to applicants' teachings—no reason has been given to dispute this. Applicants thus respectfully request reconsideration and withdrawal of these rejections.

6. Applicants traverse all of the §102 and §103 rejections set forth at pages 6-9 of the Office Action. None of the primary references cited has an effective date earlier than 1986, almost three years after the September 1983 filing date of applicants' original specification 06/535,354. Applicants reassert their entitlement to the benefit of that filing

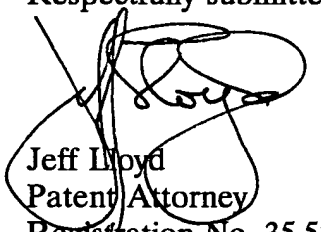
date for all pending claims, and incorporate herein by reference their arguments for priority which were set forth in portions of pages 9-16 of their last response. If the primary references are unavailable, these rejections cannot stand.

Further, applicants note that their original application, at pages 37-39, specifically exemplifies a truncated *B.t.* gene coding for a protein of about 90 kD, which is later proteolytically cleaved to yield an insecticidal fragment of about 68 kD. Thus, claims encompassing a truncated gene are entitled to the filing date of the original application. Accordingly, none of the primary references cited is available as a reference under 35 USC §§102 or 103, and those rejections should therefore be withdrawn. Such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR 1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephone interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



Jeff Lloyd
Patent Attorney
Registration No. 35,589
Phone No.: 904-375-8100
Address : 2421 N.W. 41st Street
Suite A-1
Gainesville, FL 32606

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amd\misc\7285012.amd/mjc